cheaply as if they were in the neighbourhood of Kingston." It is stated that a drought, caused chiefly by the failure of the May rains coming after a succession of dry months with parching winds, had a prejudicial effect on all agricultural operations. Mr. Morris says: "It is a subject of common remark amongst old planters that the 'seasons,' or the periodical rains which have hitherto fallen with great regularity and copiousness during the months of May and October of each year, are becoming more and more uncertain and irregular, and the effects of these conditions are clearly shown in the precariousness of the agricultural products affected by them. These remarks apply chiefly to the southern slopes of the Blue Mountains, and to such other districts stretching south and west where coffee and provisions are being chiefly raised." Under the head of "Cinchona Plantation," the cultivation of which plants has become an object of special attention in Jamaica, Mr. Morris reports very fully. He says: "In order to test the commercial value of Jamaica grown bark, no better plan could be followed than to send it in lots to the open market and place it in competition with barks from other countries. That it has so satisfactorily stood this test and brought in a large return on the outlay, and, moreover, that the results of the sales have induced cinchona planting to be undertaken in the island by private enterprise with energy and success, are matters for which the Government no less than the general public are to be congratulated." "During the past year chief attention has been given to the successful introduction of *Cinchona Ledgeriana* and its establishment as a cultivated plant in Jamaica. In addition to the plants established on the Government plantations, several thousands have been distributed amongst private planters, and each lot of these will doubtless form a nucleus from whence seeds and cuttings may hereafter be obtained, and thus prove most valuable acquisitions to private plantations." A few plants of the now well known cuprea bark, *Remijia pedunculata*, have been raised from seed received from Bogota, and are being tried in order to test the value of the bark under cultivation. An attempt is about to be made to manufacture cinchona febrifuge in the island in a similar way to what is being now done so successfully in the East Indies. By this means a valuable and cheap preparation will be available for use among the poorer classes. Besides the cinchonas the cultivation of jalap and various other economic plants has received attention during the year, so that we have evidence that a good deal of really useful work is being carried on by Mr. Morris in Jamaica.

A WRITER in the *North China Herald* on the history of gunpowder in China asserts that this explosive was known in the seventh century of our era. The alchemists of the Han dynasty, and subsequently in the fourth and following centuries, worked with saltpetre and sulphur, as well as cinnabar, red oxide of lead, and other common compounds. But in the seventh century we find gunpowder used to make a crackling sound and to afford an agreeable sight to the court of Sui Yang-ti, the emperor of that time. The earliest exhibitions of fireworks mentioned in Chinese history belong to that date. The substances used in the composition of gunpowder are all native to China, and the writer appears to prove conclusively that the Arabs derived the art of firework making, as well as gunpowder, from the Chinese. The discovery once made, the Chinese alchemists, owing to the badness of their hypotheses and the futility of their aims, were slow at improvement. But the doctors of the Arab colonies in China carried to Bagdad the germs of the Chinese discoveries, and there they were elaborated into new forms. In short, in many arts and sciences the Arabs learnt from China, and, assisted by Nestorians, Jews, and Greeks, improved on what they learned. In course of years, cannon, matchlocks, and shells for use in sieges were brought to China from Mohammedan countries. There are faint traces in the eleventh century of rude firearms; in the twelfth and thirteenth centuries the records of their use in the Chinese wars become frequent and distinct. The Golden Tartars, in their wars with South China in the twelfth century, used cannon which they called "heaven-shaking thunder." In an iron tube was placed powder which was "set fire to, and would burn down half a square *li* of houses and pierce a coat of mail made of iron rings." It is expressly stated that Genghis Khan, the Mongol conqueror, used cannon in his wars. Kublai Khan also used these weapons at a siege celebrated in Chinese history—that of Siang-yang. Hearing, it is said, the sound of the explosion, which shook the sky, and seeing that the balls entered seven feet into the earth, the Chinese defenders of the city capitulated. It is clear that China owed its knowledge of artillery to the Mohammedans. In the fourteenth century commenced the European intercourse with China, which then abandoned the Arabs, and took the Portuguese as teachers in the construction of weapons of warfare.

NEWS from Iceland states that from the 12th to the 21st of March there were violent volcanic water eruptions.

A REUTER'S telegram from Hong Kong *via* San Francisco announces the completion of the telegraph line between Canton and that colony. This is the second great line in China, and appears to have been constructed wholly by native merchants in Canton, who found the want of early communication with western markets in their commercial transactions. Vigorous preparations are also being made for the most formidable undertaking of this nature that has yet been attempted in China, viz. a line connecting Peking with Canton. According to the latest information an expeditionary party has arrived at Shanghai to conduct the necessary surveys. It will proceed first to Soochow, and there, under the escort of 200 troops, will commence its work, proceeding southward.

A NUMBER of students at the Ecole des Mines of France will during the summer make an excursion to the Arctic regions. A steamer, in charge of a Norwegian Arctic hunter, will bring the party to Throndhjem and Hammerfest, and thence to Spitzbergen, which will be examined during a fortnight's stay. The Naturalistic Museum of Paris sends two *savants* with the party.

THE additions to the Zoological Society's Gardens during the past week include two Green Monkeys (*Cercopithecus callitrichus* ♂ ♀) from West Africa, presented by Mr. Thos. H. Dixon; a Long-eared Owl (*Asio otus*), British, presented by the Rev. H. D. Grantham; a Smooth Snake (*Coronella lævis*), European, presented by Mr. W. H. B. Pain; seven Black and Yellow Cyclodus (*Cyclodus nigro-luteus*) from Tasmania, presented by Baron Ferdinand von Mueller, C.M.Z.S.; a Proteus (*Proteus anguinus*), European, presented by Miss Maud Howard; a Sea Crayfish (*Palinurus vulgaris*), British Seas, presented by Messrs. Milestone and Staniforth; three Green-winged Doves (*Chalcophaps indica*) from India, a Herring Gull (*Larus argentatus*), British, deposited; a King Vulture (*Gypagus papa*) from Tropical America, purchased; a Cabot's Tragopan (*Ceriornis caboti* ♀) from North-West China, received on approval.

OUR ASTRONOMICAL COLUMN

THE COMET OF 1707.—The elements of this comet's orbit, as calculated by Lacaille and Struyck, bear a certain degree of resemblance to those of the comet discovered by De Vico at Rome on February 20, 1846 (1846 IV. of our catalogues), to which Van Deinse's definitive calculation assigns a period of revolution of 73 years. The interval between the perihelion passages in 1707 and 1846 would give two periods of 69·1 years; there is consequently a sufficient reason for examining how far the elements of the comet of 1707 represent the observations. It appears to have been discovered by Manfredi at Bologna on November 25, and the place given in the *Mémoires* of the Paris

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Academy for that date was in R.A. 308° 25′, Decl. −24° 17′. Pingré in his *Cométographie* mentions that according to Struyck this position is erroneous, and that ten minutes should be added to the declination and five to the right ascension as printed in the *Mémoires*, adding that if Lacaille has used the Bologna observation his orbit would be less accurate than that of Struyck. The Bologna observers Manfredi and Stancari found the comet on November 25, in the same field of view of an 8-foot telescope, with two stars, the distance between which they estimated at 9′. At 7h. 14m. 47s. apparent time the centre of the comet was in the right line joining these stars, and its distance from the northernmost star was one-third of the distance between them. It is easy to see from the rough position given, that the stars in question are Piazzi XX., 296 and 298, and carrying back his places, we have for the position of the comet referred to the mean equinox of 1708·0, R.A. 307° 49′·3, Decl. −23° 44′·1. The equation of time was 12m. 37s. subtractive from apparent time, and hence the Greenwich mean time of observation was November 25·26163. The place calculated from Lacaille's orbit, first published in his "Leçons d'Astronomie," differs +7′·2 in R.A. and +5′·6 in Decl., so that it is evident he did not use the position as erroneously deduced in the *Mémoires*. The agreement of his elements with the Paris observation on December 17 is fairly good; there is a much larger deviation from the approximate places determined at Bologna, on January 13 and 17; but these observations of Manfredi and Stancari are probably affected with very material errors, as such is certainly the case with the deduced position for the night of discovery. So far as can be judged from this partial comparison of Lacaille's elements with observation, the hypothesis of identity of the comet of 1707 with that of 1846 is not supported, but the observations of the former may deserve further discussion.

THE TRANSIT OF VENUS.—Prof. C. A. Young has published his observations of all four contacts in the late transit of Venus, made at the Halsted Observatory, Princeton, N.J., with the 23-inch equatorial, and a power of 160. At the two internal contacts the aperture was diminished to 5¾ inches, "in order to make the observations comparable as far as possible with those of the various government expeditions," but at the external contacts the full aperture was employed; a polarising helioscope was attached. We have compared the times given by Prof. Young with those calculated from the reduction-equations published in this column, in the formation of which it was the main object to get geometrical contacts. It has been previously mentioned that there was a close agreement between prediction and observation in the case of the results obtained at Harvard College, and the following are the small differences (calc.-obs.) for Prof. Young's:—

I. −16s. ... II. +3s. ... III. −15s. ... IV. −4s.

THE BRITISH ASSOCIATION CATALOGUE OF STARS.—We lately remarked, not without some surprise, that a copy of this work was priced in a continental list of second-hand books at the high figure of 12*l*. 10*s*., or about three times the cost at its publication in 1845. Such a fact naturally induces the query, Is there occasion for a new general catalogue of the principal fixed stars, or, say, of stars within the limit of naked-eye vision? It is a question upon which there will probably be a wide difference of opinion, and it is one that it would be of interest to discuss.

GEOGRAPHICAL NOTES

THE last number of the *Verhandlungen der Gesellschaft für Erdkunde* of Berlin contains a paper by Prof. Brauns, late of Japan, on the Island of Yezo. The writer agrees with Mr. Keane and other ethnologists that the Ainos are a totally different race from the Japanese. The number of these people in Yezo and the Kuriles is given by the Japanese Government as 18,000, but many authors place the number as high as 50,000. In Saghalin there are 10,000 to 12,000, and if those in the southern part of Kamschatka who are living under Russian rule are included, the total number of the race would probably be from 60,000 to 70,000. In the same issue the indefatigable explorer of the Philippines, Herr Jagor, describes briefly a recent journey through Luzon. An interesting communication also is a list of the papers published by the Geographical Society of Tokio in its volume for 1880. This Society is composed, we believe, almost wholly of natives, and its papers are printed in Japanese. There appear to have been in all thirty-eight communications of one kind or another; the writers or translators (for some of the papers are apparently translations from others in European languages) are in all cases Japanese. Among the papers are several on the history and geography of Okinawa, as the Japanese call the Loochoo group; the climate of Peking; Japanese intercourse with foreign countries in the middle ages; a journey to Vladivostock; the history of geography in Japan; history and geography of Persia by a Japanese who had travelled through the country; description of Australia; description of a voyage in the Persian Gulf; of a journey on the Khirgiz steppes; ancient Japanese geographical names; description of Saghalin; on the absence of precious stones in Japan, &c., &c. Some of these papers would hardly meet with a favourable reception from the Council of the Royal Geographical Society; but in Japan they are listened to and read afterwards in their printed form by hundreds of people who have never left their own country, and who possess but a very small geographical literature. When this is remembered, the list will appear not only a creditable one to the travellers, but also a most useful one for the spread of geographical knowledge in Japan, which after all is the purpose of the Society.

THE annual report of Mr. Tremlett, the British Consul at Saigon, contains some interesting geographical information about the northern and less known districts of the Indo-Chinese peninsula. The governor of Cochin China sent out an expedition to explore the country between the Meikong and Annam at about 14° latitude. The party left Peamchileng, on the Meikong, proceeding eastward. After passing the river valley the country became hilly and wooded, intersected with numerous watercourses. No difficulty was experienced until the arrival of the travellers near the Cambodian frontiers. As they proceeded the hostility of the people became yet more pronounced, and finally their passage towards Annam was closed altogether. They were finally compelled to retreat, losing all their baggage on the way, and after three months' absence they reached a friendly post. The Moïs inhabit the wilds between Cambodia, Siam, Burmah, and China. Commerce, properly speaking, does not exist among them, and traffic is carried on by exchanges. The various roads and river are stopped up by the people themselves to prevent the passage of pillagers and enemies; as a result the people are very backward. Money is almost unknown or unappreciated among them. A native who will not work for a dollar a day will do so for a bell costing a few cents. The articles most valued by the Moïs are buffaloes, red and white cottonades, glass ware, brass wire, utensils, salt, and salt fish.

FROM the same report we learn that an exploration of the upper waters of the Saigon river by Lieut. Gauthier shows that previous charts are incorrect; the names given in them being imaginary. There appears to have existed in this region in former times one or more states in an advanced stage of civilisation, as may be seen by ruins still remaining, probably offshoots of the famous Angker Wat. The present race of Moïs claim no descent from their predecessors on the soil, and indeed it would be difficult to find a lower state than theirs. It is difficult to communicate with them, as the language is not easily picked up by the Annamites. They appear to be in a state of independence, paying no tribute to any of their neighbours, although the King of Cambodia is their nominal suzerain. The report concludes by saying that the French Government will have to send a much more serious expedition if anything is to be learned about these regions; two or three men can learn nothing.

THE great attention which France has given for many years past to the Indo-Chinese peninsula is shown by a return printed in the *Proceedings of the Société Académique Indo-Chinoise* of all the scientific expeditions despatched by the French Government to this region. These embrace archæological, ethnological, geographical, and other scientific objects, and up to 1881 they were seventy-seven in number. They commence as far back as 1680, when the Jesuit Pallu visited the courts of Tonkin and Annam. Seventeen of these took place before the military occupation of any part of Cochin China by the French; thirty-three were sent by the Ministry of Public Instruction, chiefly for archæological purposes, while the remaining twenty-seven were sent by the Ministry of Marine and the Colonies, and were devoted principally to exploration. To understand the mass of scientific work done by the French in Indo-China, it must be remembered that these seventy-seven expeditions do not include the innumerable journeys and researches of the missionaries,

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